

# 2-channel BTL driver for CD players

## BA5912AFP-Y

The BA5912AFP-Y is a 2-channel BTL driver developed to drive CD player motors and actuators. Perfect for compact applications with the use of the HSOP 25-pin package.

### ●Applications

CD players, CD-ROM

### ●Features

- 1) 2-channel BTL driver.
- 2) Perfect for compact applications with the use of the HSOP 25-pin power package.
- 3) Wide dynamic range.
- 4) External mute pin enables the muting of the output current (independent muting for channels 1 and 2). Muting both channels causes the IC to enter the standby mode.
- 5) Two internal multi-purpose operational amplifiers.
- 6) Power supply is divided into three systems (Pre V<sub>CC</sub>, Pow V<sub>CC</sub> for channel 1, and Pow V<sub>CC</sub> for channel 2)
- 7) Internal standard two operational amplifier.
- 8) Internal thermal shutdown circuit.

### ●Absolute maximum ratings (Ta = 25 °C)

Parameter	Symbol	Limits	Unit
Power supply voltage	V <sub>CC</sub>	13.5	V
Power dissipation	P <sub>d</sub>	1.45*1	W
Operating temperature	T <sub>opr</sub>	-35~+85	°C
Storage temperature	T <sub>stg</sub>	-55~+150	°C

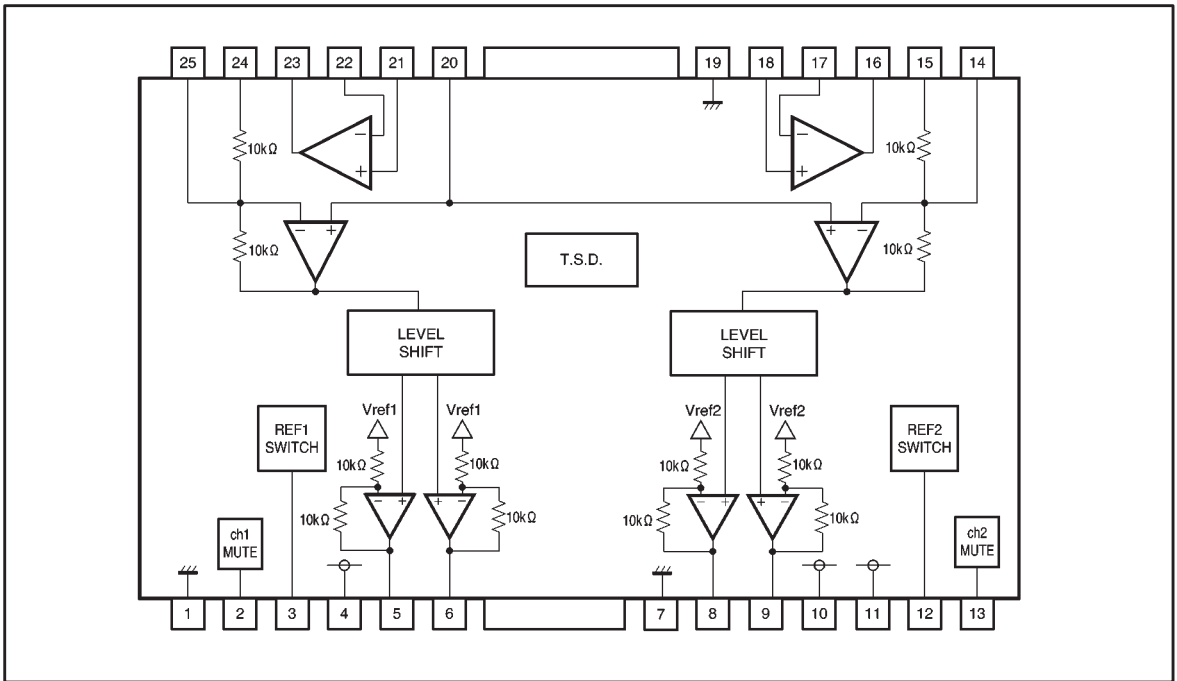
\*1 When mounted on a 70mm×70mm×1.6mm glass epoxy board with copper foil coverage of less than 3%.  
Reduced by 11.6mW for each increase in Ta of 1°C over 25°C.

### ●Recommended operating conditions (Ta = 25 °C)

Parameter	Symbol	Limits	Unit
Power supply voltage	Pre V <sub>CC</sub>	4.5~13.2	V
Power-stage power supply voltage	Pow V <sub>CC</sub>	4.5~Pre V <sub>CC</sub>	V



● Block diagram

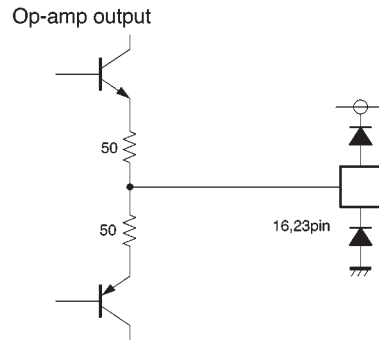
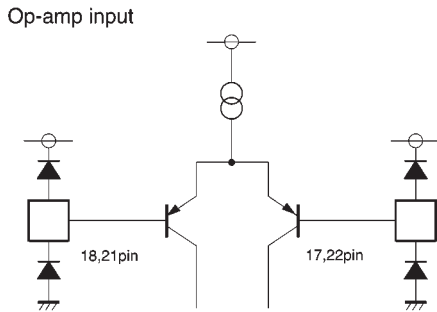
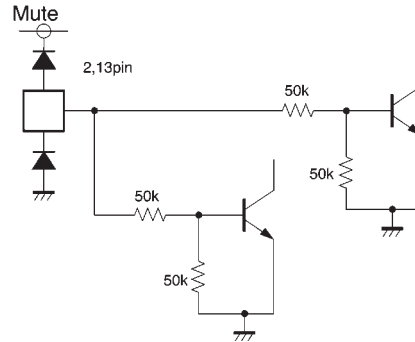
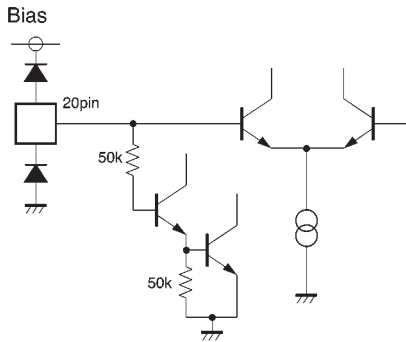
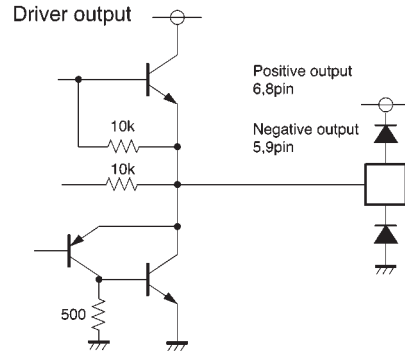
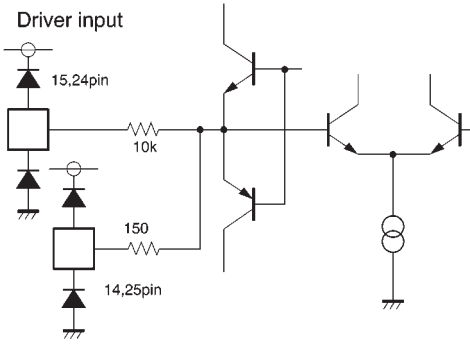


● Pin descriptions

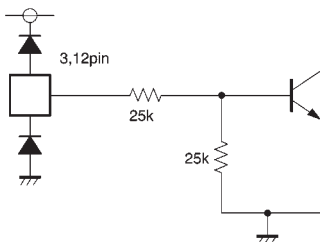
Pin No.	Pin name	Function	Pin No.	Pin name	Function
1	GND	Substrate GND	14	IN2'	Input for channel 2 gain adjustment
2	MUTE1	Channel 1 mute	15	IN2	Channel 2 gain fixed input
3	REF1	Channel 1 Vref switch	16	OP1-OUT	Op-amp 1 output
4	Pow Vcc1	Pow Vcc (channel 1)	17	OP1-IN-	Op-amp 1 negative input
5	OUT1-	Channel 1 negative output	18	OP1-IN+	Op-amp 1 positive input
6	OUT1+	Channel 1 positive output	19	GND	Substrate GND
7	GND	Substrate GND	20	BIAS	Bias input
8	OUT2+	Channel 2 positive output	21	OP2-IN+	Op-amp 2 positive input
9	OUT2-	Channel 2 negative output	22	OP2-IN-	Op-amp 2 negative input
10	Pow Vcc2	Pow Vcc (channel 2)	23	OP2-OUT	Op-amp 2 output
11	Pre Vcc	PreVcc	24	IN1	Channel 1 gain fixed input
12	REF2	Channel 2 Vref switch	25	IN1'	Input for channel 1 gain adjustment
13	MUTE2	Channel 2 mute			

Note: Positive output and negative output are the polarities with respect to the input.

● Input / output circuits



Vref switch



●Electrical characteristics (unless otherwise noted,  $T_a = 25\text{ }^\circ\text{C}$ , Pre  $V_{CC} = \text{Pow } V_{CC} = 5\text{V}$ , BIAS = 2.5V,  $R_L = 8\Omega$ )

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Circuit current	$I_{CC}$	—	9.0	14.0	mA	No load, REF1, $2 \geq 2.0\text{V}$
Circuit current during standby	$I_{SCC}$	—	0	100	$\mu\text{A}$	No load, REF1, $2 \leq 0.5\text{V}$
〈Driver〉						
Output offset voltage	$V_{OO}$	−50	—	50	mV	
Maximum output amplitude 1	$V_{OM1}$	3.2	3.5	—	V	REF1, $2 \leq 0.5\text{V}$
Maximum output amplitude 2	$V_{OM2}$	3.7	4.0	—	V	Pre $V_{CC} = 12\text{V}$ , Pow $V_{CC} = 5\text{V}$ REF1, $2 > 2.0\text{V}$
Closed-loop voltage gain	$G_{VC}$	10.0	11.5	13.0	dB	$V_{IN} = \text{BIAS} \pm 0.5\text{V}$
Mute on voltage	$V_{MON}$	GND	—	0.5	V	
Mute off voltage	$V_{MOFF}$	2.0	—	$V_{CC}$	V	
Vref switch voltage 1	$V_{ref1}$	GND	—	0.5	V	Pre $V_{CC} = \text{Pow } V_{CC}$
Vref switch voltage 2	$V_{ref2}$	2.0	—	$V_{CC}$	V	Pre $V_{CC} > \text{Pow } V_{CC} + V_F$
〈Operational amplifier〉						
Offset voltage	$V_{OFOP}$	−5	0	5	mV	
Input bias current	$I_{BOP}$	—	—	300	nA	
Output high level voltage	$V_{OHOP}$	4.00	4.36	—	V	
Output low level voltage	$V_{OLOP}$	—	0.74	1.1	V	
Output drive current sink	$I_{SINK}$	10	50	—	mA	50 $\Omega$ at $V_{CC}$
Output drive current source	$I_{SOURCE}$	10	40	—	mA	50 $\Omega$ at GND
Slew rate	$SR_{OP}$	—	1	—	V/ $\mu\text{s}$	100kHz rectangular wave, 4V <sub>P-P</sub> output

● Measurement circuits

(Driver block)

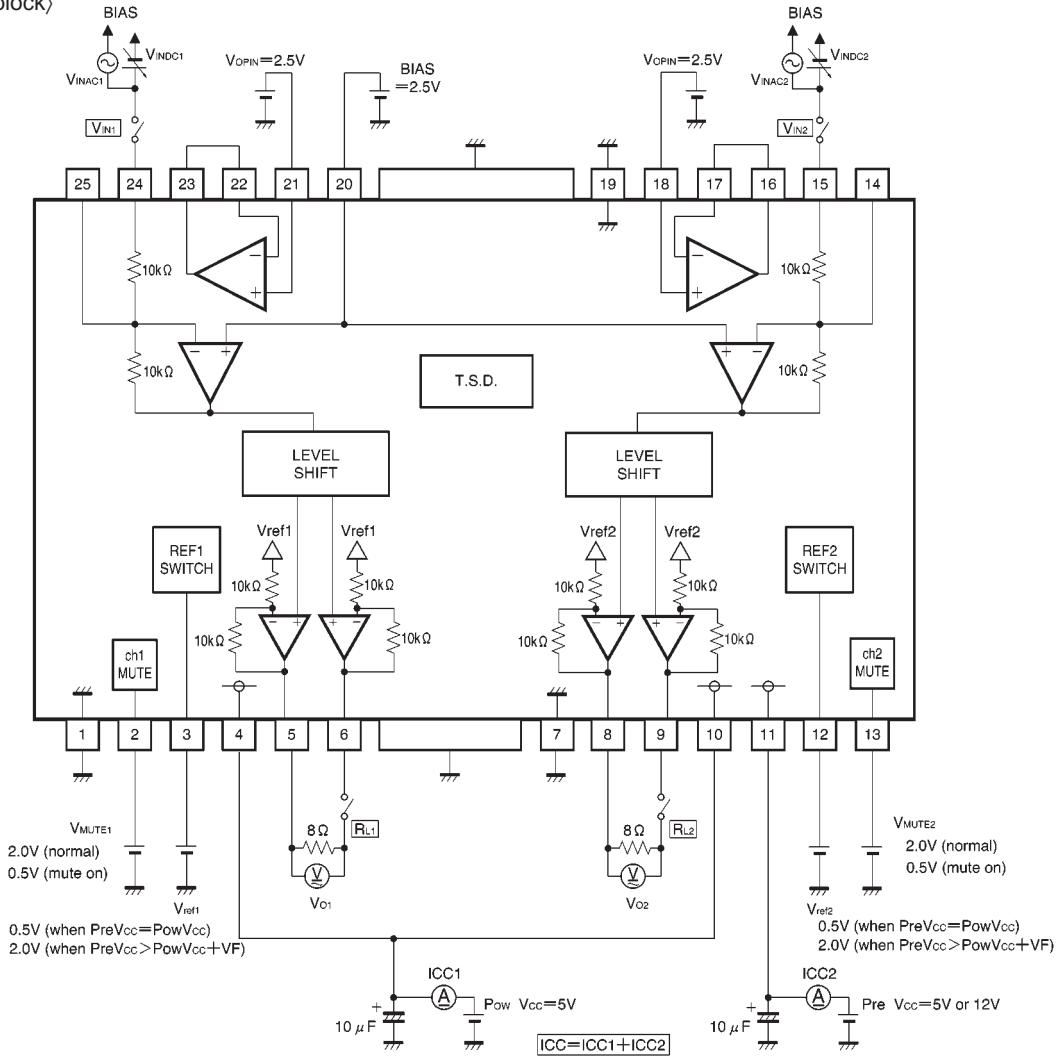


Fig.1

〈Operational amplifier block〉

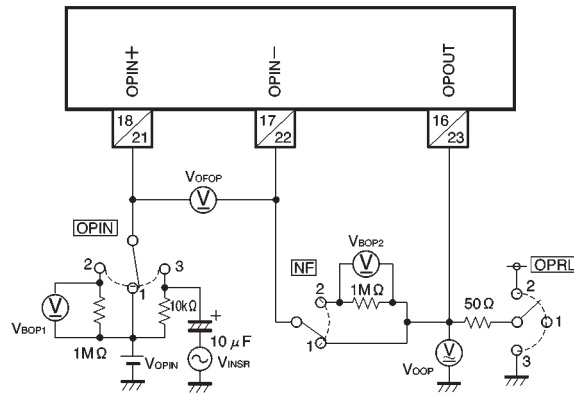


Fig.2

●Application example

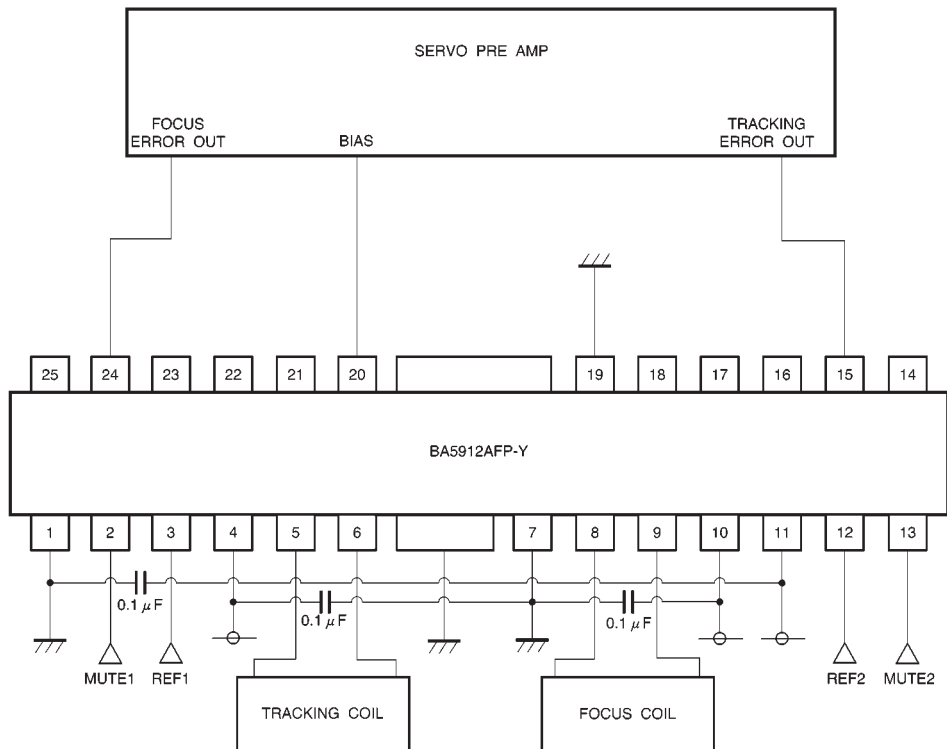


Fig.3

### ● Operation notes

- (1) The BA5912AFP-Y contains a thermal shutdown circuit. When the chip temperature reaches 175 °C (Typ.), the output current is muted. If the chip temperature then drops below 150 °C (Typ.), then the mute is released.
- (2) By having the voltage of the mute pins (pins 2 and 13) open or lowered to 0.5V or below, you can independently mute the output current for channels 1 and 2. For normal conditions, have the voltages for the mute pins (pins 2 and 13) pulled up to 2.0V or greater. If the both mute pins (pins 2 and 13) are open or 0.5V or less, then the IC automatically enters the standby mode.
- (3) If the voltage of the bias pin (pin 20) drops below 1.4V (Typ.), outputs are muted. For normal conditions, have the voltage above 2.0V.
- (4) If the power supply voltage drops below 3.5V (Typ.), internal circuits turn off. If the power supply voltage then rises to 4.0V (Typ.), the circuits turn on.

- (5) If the voltage of the thermal shutdown, mute ON, or bias pin drops, or if the power supply voltage drops, the mute is activated; however, in these situations, only the drivers are muted. Also, the output pin voltage becomes the internal bias voltage.
- (6) When  $Pre V_{CC} = Pow V_{CC}$ , have the Vref switch pin open or at 0.5V or less (internal bias voltage =  $(Pow V_{CC} - VF) / 2$ ). When  $Pre V_{CC} > Pow V_{CC} + VF$ , have the Vref switch pin pulled up to 2.0V (internal bias voltage =  $Pow V_{CC} / 2$ ).
- (7) Connect a bypass capacitor (approx. 0.1μF) between the bases of the power supply pins of this IC.
- (8) Even though the radiation fins are connected to ground within the package, be sure to also connect them to a ground externally as well.

### ● Electrical characteristic curves

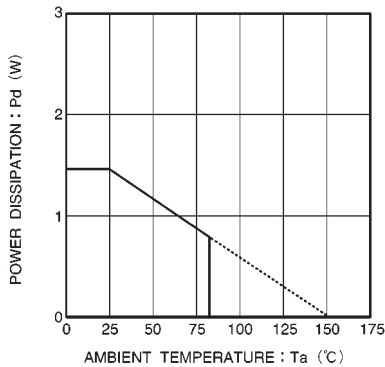


Fig.4 Thermal derating curve

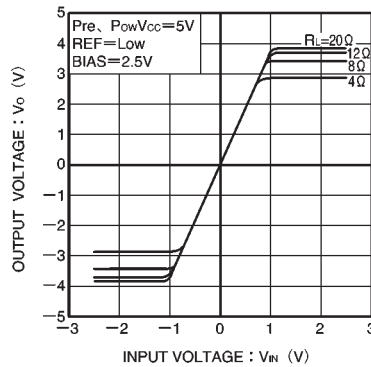


Fig.5 Driver I / O characteristics  
(When  $PreV_{CC}=PowV_{CC}$ , with load regulation)

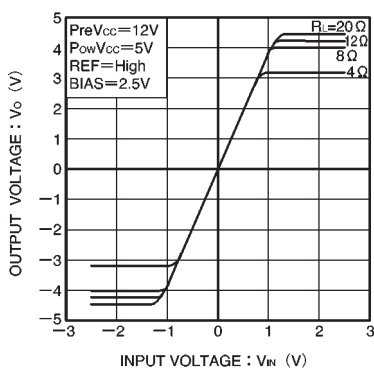


Fig.6 Driver I / O characteristics  
(When  $PreV_{cc} \geq PowV_{cc} + VF$ , with load regulation)

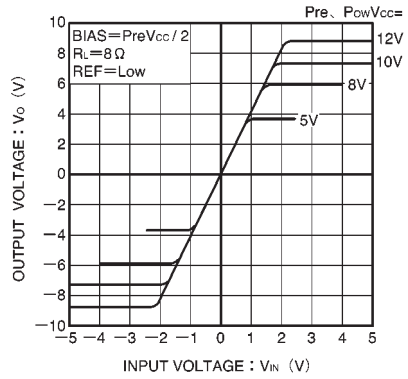


Fig.7 Driver I / O characteristics  
(With  $PreV_{cc}$  and  $PowV_{cc}$  regulation)

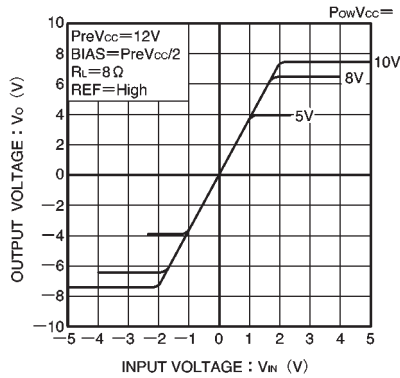


Fig.8 Driver I / O characteristics  
(With  $PowV_{cc}$  regulation)

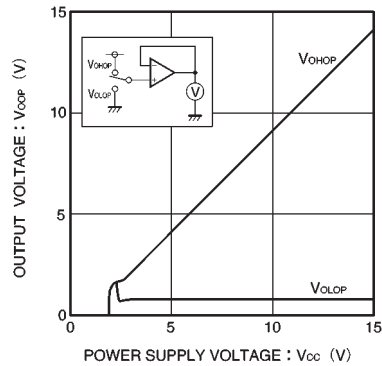


Fig.9 Power supply voltage vs.  
op-amp output voltage

● External dimensions (Units: mm)

